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Research Document 2002/103

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**Fishermen's Indicators: a Pilot
Questionnaire Survey on Fishing
Conditions in the Div. 4X Groundfish
Fishery in 2001 and 2002**

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Secrétariat canadien de consultation scientifique

Document de recherche 2002/103

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**Indicateurs fondés sur les pêcheurs :
enquête pilote par questionnaire sur
les conditions de la pêche du poisson
de fond dans la division 4X en 2001 et
en 2002**

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Ce document est disponible sur l'Internet à:

ISSN 1480-4883

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Abstract

Greater utilization of fishermen's knowledge in fishery management is universally recognized as necessary but mechanisms for doing this need further development. A major obstacle to utilizing fishermen's information in scientific stock assessments has been the difficulty of incorporating it into the models used. However, the newly developed Traffic Light Method can easily incorporate indicators that reflect fishermen's experiences. A vehicle for systematic collection of fishermen's views on fishing conditions is required to provide such indicators. This document presents the results of a pilot interview survey to collect such information from groundfish fishermen fishing in Div. 4X in 2001 and 2002. It proved possible to interview only 40 fishermen over the two years, 33 from the mobile gear fleet and seven from the fixed gear fleet. The survey asked questions that allowed inferences to be made about stock abundance, recruitment prospects, fish condition and bycatches. Many of the fishermen interviewed viewed the survey positively and provided extensive guidance on how it could be improved. It is considered worthwhile to pursue this initiative further but new methods for administering the survey, and some financial support, are necessary.

Résumé

Il est universellement reconnu qu'il faut accroître l'utilisation des connaissances des pêcheurs dans la gestion des pêches, mais des mécanismes pour ce faire doivent être mis au point. Un important obstacle à l'utilisation des connaissances des pêcheurs dans l'évaluation scientifique des stocks est la difficulté d'intégrer cette information dans les modèles utilisés. Toutefois, la méthode des feux de circulation récemment mise au point peut aisément intégrer des indicateurs qui traduisent l'expérience des pêcheurs. L'obtention de tels indicateurs nécessite un moyen de recueillir systématiquement l'avis des pêcheurs sur les conditions de la pêche. Dans ce document, nous présentons les résultats d'une enquête pilote par entrevues visant à recueillir de telles informations auprès des pêcheurs de poisson de fond de la division 4X en 2001 et en 2002. Seulement 40 pêcheurs ont pu être interviewés durant ces deux années, soit 33 pêcheurs de la flottille de pêche aux engins mobiles et sept de la flottille de pêche aux engins fixes. Nous leur avons posé des questions permettant de tirer des conclusions sur la taille des stocks, les perspectives de recrutement, la condition des poissons et les prises accessoires. Bon nombre des pêcheurs interviewés avaient une opinion favorable de l'enquête et ont proposé des moyens de l'améliorer. Nous estimons que la poursuite de ce projet en vaut la peine, mais que de nouvelles méthodes d'organisation de l'enquête ainsi qu'un soutien financier sont nécessaires.

Introduction

Development of fishermen's indicators through systematic collection of information from them on their perspectives of fishing conditions and of compliance with regulations would provide a basis for the industry to play a greater and more influential role in both stock assessment and management planning. Departmental policy is increasingly recognizing the need to put greater responsibility for the management of fisheries into the hands of the industry. An essential ingredient of this responsibility is that fishermen's experiences become an integral part of the knowledge base on which fisheries are managed.

Failure of Science to adequately utilize the knowledge of fishermen in stock assessment has been a longstanding cause for criticism. Despite substantial improvements in industry involvement in stock assessment in recent years (industry and sentinel surveys, co-operative research projects, scientist-fishermen meetings, industry port sampling), this criticism remains. The interface between Science and industry remains narrow, much of the interaction being with fishermen's representatives; the majority of fishermen remain uninvolved.

The major obstacle to utilising fishermen's information has been the difficulty of incorporating what has been called anecdotal information into quantitative stock assessment procedures. However, steps recently taken to implement the Traffic Light Method into groundfish stock assessments in Scotia-Fundy Sector, Maritimes Region, provide a solution. A broad range of information, qualitative as well as quantitative, can be incorporated into stock assessments using this method. For the first time, it is possible for the influence of fishermen's information on the decision process to be clearly demonstrable.

The Objective-Based Fisheries Management (OBFM) initiative emphasises the importance of monitoring Integrated Fisheries Management Plan (IFMP) performance. Scotia-Fundy groundfish has been chosen as a pilot for application of OBFM. Thus indicators of the status of all the main elements of the fishery system, not just the biological status of stocks, are required. Indicators of fishing conditions related to broader conservation issues (e.g. incidental mortalities of non-target species) and of regulatory compliance are also essential to evaluation of plan performance. These are difficult to obtain through surveillance programs. Experience elsewhere suggests that obtaining compliance estimates directly from fishermen is practical and cost-effective (e.g. Sutinen et al., 1990).

Consultations on a proposal to systematically collect information from groundfish fishermen in Scotia-Fundy through an annual survey were conducted in 2000-01. There was general support among the Fishermen's Association personnel and the individual fishermen consulted for the idea of developing a better method of capturing the experience of fishermen into the stock assessment process (but reservations about compliance indicators). Science staff, many of whom conduct informal surveys among industry contacts on the stock of interest to them, saw value in adopting a more general, systematic approach. The Fisheries Management Studies Working Group of RAP debated the need for and methods of obtaining fishermen's indicators (RAP, 2001). The experiences of the Gulf Sector, Maritimes Region, and of the FRCC Southern Team, both of which conducted surveys to collect such indicators, were reviewed (e.g. Hurlbut and Daigle, 2000; FRCC, 2000). Participants concurred that some sort of standard multi-year survey of fishermen was the only way to collect their views with sufficient consistency that

results could be used in stock assessments. Agreement in principle was reached with FRCC on co-operation in establishing a Scotia-Fundy fishermen's survey.

The present report describes the results of a pilot experiment conducted in 2001 and 2002 by Marine Fish Division (MFD), Science Branch, to develop and apply a survey to groundfish fishermen in Div. 4X on fishing conditions. Data products from the survey are evaluated for possible use during RAP assessments and OBFM plan development. Several industry representatives rejected initial proposals for questions on compliance and it was decided to defer the issue of industry-based compliance indicators until fuller consultations could be conducted.

Methods

It is essential to the longer-term success of the project that fishermen view it favourably and are supportive of its output as a legitimate representation of their views. Thus, although MFD was the lead agency and administrator of the pilot, it was decided that DFO personnel should not conduct the survey. The preferred method was for the industry to administer data collection itself, through its associations. It was thought important also that data be collected directly from fishermen during face-to-face interviews with designated data collectors. This maximizes the possibilities of obtaining high quality answers by ensuring that each respondent was provided with:

- An explanation of how the survey was being used
- Guidance and explanation of the questions, so that he/she had the opportunity to discuss the relevance, point, or use of the question
- Technical support in filling out the survey

It was thought that this method also provided some safeguard against bias in respondents as a result of self-selection and against collusion among respondents (dangers associated with mail-out methods).

Questionnaire content and phraseology of questions must be meaningful to fishermen while eliciting answers that convey unambiguous information to data analysts. MFD devised a provisional questionnaire as a basis for consultation with fleet representatives and fishermen. Revised questions were then formulated. The questionnaire was kept basic, as few questions being asked as possible.

The questionnaire survey (Appendix 1) consisted of 20 questions, which focused on the following:

- Context of the respondent (questions 1-9): gear, vessel size, fishing season, length of an average trip, years of experience, species directed for during the year, and areas each respondent fished.
- Fishing conditions (questions 10-17):
 - Abundance of fish – catch rates compared to last year and the best year
 - Small fish abundance – amount of small fish in catch compared to last year
 - Fish condition – condition of fish in the catch compared to last year
 - By-catches – by-catch of fish in the catch compared to last year in the cod/haddock/pollock, redfish, silver hake, and halibut fisheries.
- Opinions (questions 18-20): about the questions asked, about what other questions should be asked, and about any other issues.

Two fishermen's associations, the Scotia Fundy Mobile Gear Fishermen's Association (SFMGFA), and Shelburne Community Management Board 'B', agreed to administer the survey to captains of fishing boats in their fleet after the 2001 and 2002 fishing seasons.

Surveys were conducted in two phases. The '2001' SFMGFA surveys were conducted in spring 2002, representing the fishing season from April 1 2001 to March 31 2002. The '2002' surveys were conducted in September 2002, and thus represent the first half of the year only. Since the fixed gear fishery occurs between the months of May and November, surveys were conducted in November 2001 when memory of the fishing season would be strongest. The 2002 surveys were conducted in September.

Surveys were conducted on an opportunistic basis in 2001. Surveys with the mobile gear group were conducted with fishermen at Shelburne, Digby Neck and Pubnico wharves. Surveys for the fixed gear group were conducted with fishermen at meetings. In 2002, interviewers attempted to re-interview respondents from the previous year to keep the results as consistent as possible from year to year.

For analysis, a score from 1 to 5 was assigned to quantify the answers to each of survey questions 10 to 17 (the questions on fishing conditions). When five options were presented, the answers were scored progressively from one to five. When there were three options, these were scored 1, 3 and 5. "No opinion" was not scored. The high score was given to higher abundance, fatter fish and large problems (see Results). An overall score was calculated as a weighted average of the category scores.

Results

Mobile gear (otter trawl) respondents totalled 25 in 2001 and 8 in 2002. Fixed gear respondents (longliners and handliners) totalled 4 in 2001 and 3 in 2002. Surveys from the handline and longline fishery took approximately 10 minutes on average to fill out, while the mobile gear group took up to 1.5 hours. The industry representative in the mobile gear group conducted most surveys, however fishermen with or without the interviewer present filled out surveys from the fixed gear group. The responses from both gear groups to questions 10-17 on fishing conditions are summarized in Table 1¹. The more numerous answers of the mobile gear respondents are used below to illustrate the results obtained.

The contextual questions were intended to allow the answers to questions on fishing conditions to be categorized or qualified. Results could be sub-divided by boat size, gear type, statistical Unit Areas fished and the length of the captain's experience. Changes in seasonality of fishing, trip length, areas fished and gear construction can also be detected by these questions and used as qualifiers to the results. It can be seen, for example, that the results for otter trawlers directing for haddock in 2002 are less representative of fishing conditions in Unit Areas 4Xmno than are those for 2001 (Fig. 1). Ranking of 'species directed for' during the season (Q.8), i.e. species sought, provides options for selecting the subsets of responses the analyst thinks might be most meaningful. For example, mobile

¹ A more comprehensive description of results is given in an unpublished report by J. West - Questionnaire results from the 2001 and 2002 4X groundfish fishery for mobile and fixed gear groups, September 2002 (44pp) and in excel spreadsheets, available on request from R. Branton, MFD.

gear responses could be divided into haddock, redfish and silver hake directed fisheries (Fig. 2²).

The first of the questions on fishing conditions asked how catch rates compared to the previous year (Q.10) and this is interpreted as being an indicator of the abundance of the fished stock. Scores based on all answers combined are given in Table 1. Table 2 subdivides the answers by directed fishery. For example, the haddock-directed mobile gear fishery respondents reported higher catch rates of haddock in 2001 than in the previous year with a score of 3.37, whereas they reported the same catch rate in 2002 as in 2001 (score = 3.00) (Fig. 3). Scores for mobile gear fishery respondents overall, i.e. regardless of the species being directed for, were almost identical to the scores for the haddock-directed fishery (3.35 and 3.00 for 2001 and 2002, respectively - Table 1). This correspondence is not surprising given that the great majority of respondents declared haddock as their primary species fished (Fig. 2). Some results for other species show greater differences (Tables 1 and 2). Note that, in Fig. 3, the number of observations is shown above the bars and the scoring scale is shown below the X-axis. The total number of observations (excluding non-respondents) and the overall score are shown on the top-right of the figure. (This format is used for all subsequent figures.)

Compared to catch rates in their best year (Q.11), respondents rated 2001 catch rates of haddock in the haddock-directed mobile gear fishery as being slightly lower (score = 2.85). Catch rates in 2002 were rated even lower (score = 2.50) (Fig. 4). It is noteworthy that answers to both Q.10 and Q.11, which ask the same question about current year catch rates against different base periods, show the same relativity between 2001 and 2002; 2002 catch rates were scored as being 89% and 88% of 2001 catch rates, respectively.

Fishermen were asked how much small fish they saw in their catches (Q.12). This was interpreted as an indicator of the strength of year classes entering the fished part of the stock, i.e. of recruitment. Thus, "a lot more small fish" was viewed as good and scored as 5 (Tables 1 and 2). For example, haddock-directed mobile gear fishery respondents reported slightly higher amounts of small haddock in their catches compared to the previous year in 2001 (score = 3.68) whereas, in 2002, catches of small haddock were unchanged (score = 3.00) from the previous year (Fig. 5).

Question 13 asked respondents to report on the condition of fish compared to the previous year in terms of being "thinner" or "fatter". Results were scored with the highest number (5) reflecting much fatter fish in the catch than the previous year. There was notably less variability in the scores for this question than in those for Q.10-12 (Tables 1 and 2), most results suggesting no change. However, in the haddock-directed mobile gear fishery respondents reported the condition of haddock to be fatter in comparison to the previous year, scoring 3.13 and 3.33 in 2001 and 2002 respectively (Table 2).

Questions 14-17 asked respondents to report whether they had by-catch problems in the directed fisheries for cod/haddock/pollock, redfish, silver hake and halibut in the year surveyed. Results were scored with the highest number (5) reflecting a large by-catch problem, and the lowest number (1) reflecting no by-catch problem. Thus, in this case, a high score is bad. While this could be viewed as an inconsistency, it was thought that having a low score for a "large problem" would be counter-intuitive. There is a precedent

² Some respondents mistakenly specified more than one species as a first priority requiring a rescaling of results to total 100%.

for this in fishing mortality, where a high value is also indicative of a large problem. Answers to these questions are summarized in Table 1. As an example, in the mobile gear redfish fishery, pollock by-catch problems were reported in 2001 and 2002. In 2001, pollock by-catch scored 3.57, and, in 2002, 3.40 (Fig. 6).

The remaining questions (Q.18-20) asked for feedback on the survey and for additional comments. Most respondents thought that the survey had asked the right questions overall; of the 29 respondents in 2001, 20 said yes, three said no and six did not respond. (Respondents in 2002 are understood to be largely a subset of those responding in 2001.) However, the usefulness of question 13 on fish condition was brought into question by two respondents who said that they would not notice year to year changes. Also, five respondents thought the wording to question 11, which compares catch rates from the present year to the best year ever, could be misleading. The best year could have been a fluke, memories of events back that far can be unreliable and areas fished and gear used are different now. One suggestion was to use the period since introduction of ITQs for the mobile fleet (approximately the last 10 years). The suggestion was also made that questions should be asked in relation to spatial scales smaller than Div. 4X. One fixed gear respondent thought that questions 14-17 on bycatches were inappropriate. Suggestions were made that additional questions should be asked about gear conflicts and on the appropriateness of catch quota amounts.

The last question (Q.20) elicited general comments on anything that the respondents wanted to pass along. Comments were extensive and varied. Virtually all were from mobile gear fishermen as not only were few responses obtained from fixed gear fishermen, but over half of those that were received were missing the last page, which contained this question. Despite the diversity of the responses, several issues emerged as being of particularly widespread concern:

- Sixteen respondents felt that there was a large by-catch problem with pollock in the redfish fishery and four of these respondents expressed concern that redfish were being over-exploited and that the quota should be reduced.
- Eight respondents felt that the minimum size of halibut should be reduced because there is a high mortality among the undersized halibut caught, and that it is pointless to throw away dead halibut.
- Seven respondents said that it was good to have a survey such as the present one, although two questioned whether the results would be looked at or taken into account in stock assessments.
- Five respondents expressed concern about Science issues, three in regards to not being informed or invited to stock assessment (RAP) meetings. However, two implied that it was pointless to attend as their views were not heard and a third that he would not attend even if informed.

Discussion

The pilot survey was conducted on a small scale and the number of respondents, especially in the fixed gear fisheries, was too low to use the results in stock assessments. However, the pilot did identify more clearly the problems that need to be resolved before initiating a full-scale survey and, in some cases, pointed towards potential solutions. The positive response of many fishermen to the questionnaire survey encourages the view that they could come to see such a survey as a useful vehicle for communicating their views.

The use of the face-to-face interviewing method is clearly superior to distributing questionnaires to fishermen to complete by themselves. Those surveys not carried out by interviewers were less likely to be complete and more likely to be filled out incorrectly. A knowledgeable interviewer provides the primary quality control and, even though direct interviewing is more time consuming (up to 1.5 hours, even for this short set of questions), this should be the approach taken in any future surveys. Efficiency could be expected to increase as fishermen become experienced in answering the questions.

While fishermen agreed, on the whole, that the right questions had been asked, they provided the following guidance on improvement:

- With regard to the question on fish condition, there is evidence from the lack of variation in the data and from the comments provided that fishermen had difficulty with it and it seems that asking about annual changes is not useful. Phrasing the question in absolute terms (good/bad) might make it easier to answer, but perhaps the question should be dropped.
- There is a need for a more suitable temporal benchmark for Q.11 on catch rates. "Best year ever" was considered unsuitable and some shorter, recent period should be used. (This should be considered for Q.12 on small fish also, perhaps.)
- A need is seen for a finer spatial resolution than Div. 4X. In actuality, Q.9, which requires identification of Unit Areas fished, does provide for some finer scale resolution, although it is likely that only gross changes in fishing patterns would be detected. An important caution is that the cost of finer resolution is a multiplication of the number of questions to be answered as many fishermen can be expected to fish in several areas. (A refinement of Q.9 would be to ask for percentages of time fished in each Unit area, rather than presence/absence.)
- Including a comment section after each question would allow respondents to comment as they are completing the question. This might encourage more comments than are captured by a single comment section at the end of the interview. (A number of respondents included comments beside questions.)
- More information could be gleaned from Q.2 on gear changes if the respondent was asked to select from a list of gear changes and to comment on how these changes have affected catch rates or bycatches.

The results of this pilot survey of fishermen's opinions encourage the view that indicators of stock abundance and recruitment can be developed from such data for use in assessment of stock status. Indicators of trends in bycatches identify the scale of fishery

interactions, but could also be used as additional indicators of abundance and recruitment of bycatch species in some instances. For example, is the increasing problem of bycatches of small pollock in the redfish fishery an indicator of strong recruiting year-classes of pollock? Indicators for use in stock assessments need data to be collected in higher volume than was possible for this pilot. Data collection for several years would be necessary to establish the consistency and reliability of results.

This initiative could provide additional indicators suitable for inclusion in Traffic Light stock assessments. The importance of this lies in being able to show fishermen that their views are being incorporated directly into the analysis of stock status, to be able to demonstrate to them how much weight their views are being given and to illustrate for them the resulting impact on regulatory measures. This would be a major step along the path of shared responsibility for resource management. While it will be no small task to establish a satisfactory survey for the regional groundfish fisheries, the rewards are likely to justify the expense. This proposal is ideally suited for implementation through a Joint Industry/DFO Project Agreement.

Acknowledgements

We wish to thank the many people who have taken the time to give us their views on our proposals and their encouragement to proceed. In particular, we thank our collaborators in the Scotia-Fundy Mobile Gear Fishermen's Association and in Shelburne Community Management Board 'B' for their practical support, especially Susan Arsenault and Pam Decker. We are grateful also to Paul Fanning, MFD, BIO, for reviewing this paper.

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Table 1. Combined fishery scoring (Q10-13), and directed fishery by-catch scoring (Q14-17), for mobile gear and fixed gear groups. (For Q10-13, 'n' is the total respondents within mobile and fixed gear groups. For Q14-17, 'n' is the number of respondents to each question within mobile and fixed gear groups. The 'n' for individual entries varies.)

2001	Combined Fishery Results								Directed Fishery By-catch Results							
Question #	10		11		12		13		14		15		16		17	
Gear	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix
n=	25	4	25	4	25	4	25	4	23	4	14	0	6	0	0	2
Cod	3.45	4.50	2.50	3.75	3.18	4.25	3.14	4.00	3.29	2.00	1.62		1.00			2.00
Haddock	3.35	3.75	2.75	3.50	3.64	4.00	3.10	3.00	1.00	1.00	1.86		1.00			1.00
Pollock	2.26	3.33	1.81	2.50	3.32	2.50	3.00	2.67	1.00	1.00	3.57		1.00			1.00
Redfish	2.35		1.69		3.46		3.00		1.00	1.00	1.00		1.00			1.00
Silver Hake	3.67		3.00		3.22		3.00		1.00	1.00	1.91		1.00			1.00
White Hake	3.00	3.00	2.50	4.00	2.80	3.00	3.11	3.50	1.24	2.00	2.38		1.00			2.00
Cusk	3.00	3.33	2.00	3.33	3.00	3.33	3.00	3.00	1.00	1.00	1.17		1.00			1.00
Halibut	3.25	4.33	2.46	4.33	3.81	3.67	3.00	3.67	1.11	3.67	1.00		1.00			3.00
Winter	2.67		1.94		3.15		3.06		1.00	1.00	1.00		1.00			1.00
Plaice	2.62		1.80		3.29		3.00		1.00	1.00	1.00		1.00			1.00
Witch	2.44		1.85		3.38		3.00		1.00	1.00	1.00		1.00			1.00
Yellowtail	2.75		2.00		3.30		3.00		1.00	1.00	1.00		1.00			1.00
Monkfish	3.17	2.50	2.83	2.50	3.44	3.00	3.00	3.00	1.12	1.00	1.33		1.00			1.00
Wolffish	2.60	3.00	2.00	3.00	3.00	4.00	3.00	3.00	1.00	1.00	1.00		1.00			1.00
Dogfish	3.29	3.00	2.20	3.00	3.00		3.00	3.00	2.78	1.00	3.31		1.00			1.00

2002	Combined Fishery Results								Directed Fishery By-catch Results							
Question #	10		11		12		13		14		15		16		17	
Gear	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix	Mob	Fix
n=	8	3	8	3	8	3	8	3	6	3	5	0	2	0	0	3
Cod	3.00	3.50	3.00	4.00	3.20	3.67	3.33	3.33	2.60	1.00	1.00		1.00			1.00
Haddock	3.00	3.00	2.50	4.00	3.00	3.67	3.33	3.00	1.00	1.00	1.00		1.00			1.00
Pollock	4.17	2.00	3.50	4.00	4.40	4.00	3.20	3.00	1.00	1.00	3.40		1.00			1.00
Redfish	2.25		2.50		3.00	3.00	3.00		2.00	1.00	1.00		1.00			1.00
Silver Hake	3.00	3.00	3.00	3.00	3.00	3.00	3.00			1.00	1.00		1.00			1.00
White Hake						3.00	3.00	3.00	1.00	1.00	2.00		1.00			1.00
Cusk				3.00	4.00	3.00	3.00	3.00	1.00	1.00	1.00		1.00			1.00
Halibut		5.00		5.00	3.00	2.50	3.00	3.00	1.00	3.00	1.00		1.00			1.00
Winter	3.20		2.75		3.50	3.00	3.00		1.00	1.00	1.00		1.00			1.00
Plaice	3.00		3.00		3.50	3.00	3.00		1.00	1.00	1.00		1.00			1.00
Witch	3.00		2.67		3.25	3.00	3.00		1.00	1.00	1.00		1.00			1.00
Yellowtail						3.00	3.00		1.00	1.00	1.00		1.00			1.00
Monkfish	3.50	4.00	4.00	5.00	4.25	3.00	3.25	3.00	2.00	1.00	1.00		1.00			1.00
Wolffish	2.00				2.00	3.00	3.00		1.00	1.00	1.00		1.00			1.00
Dogfish	3.00				3.00	3.00	3.00	3.00	2.60	3.00	4.50		1.00			1.00

Table 2. Scoring for all species by directed fishery for mobile gear for Q10-13. (The 'n' provided is the total number of respondents by directed fishery. The 'n' for individual entries varies.)

2001		11										12										13											
Question #	species directed for	11										12										13											
n=		cod	had	pol	red	silv	win	pla	wit	cod	had	pol	red	silv	win	pla	wit	cod	had	pol	red	silv	win	pla	wit	cod	had	pol	red	silv	win	pla	wit
		12	19	10	9	6	4	3	3	12	19	10	9	6	4	3	3	12	19	10	9	6	4	3	3	12	19	10	9	6	4	3	3
	Cod	333	347	340	367	267	400	367	367	240	254	250	220	267	233	200	200	308	321	320	322	300	325	333	333	317	312	330	300	300	367	350	350
	Haddock	317	337	340	311	267	350	300	300	240	285	275	220	267	300	200	200	375	368	380	367	300	400	400	400	308	313	322	300	300	333	300	300
	Pollock	250	228	200	213	267	225	233	233	178	186	189	183	200	200	200	200	320	316	344	356	250	375	367	367	300	300	300	300	300	300	300	300
	Redfish	238	227	243	244	250	233	200	200	157	182	186	167	200	250	200	200	320	350	333	371	300	433	500	500	300	300	300	300	300	300	300	300
	Silver Hake	400	333		400	367				300	300	200	233	333				300	340	300	300	300			300	300	300	300	300	300	300	300	
	White Hake	250	300	267			300			167	271	267	200	200	300	300	300	300	267	267	300	300	200			300	313	325	300	300	350	300	300
	Cusk	300	300	300						100	250	200	200	200	200	200	200	300	300	300	300	300	300			300	300	300	300	300	300	300	300
	Halibut	350	325	313	325	300	300	300	300	243	258	257	200	300	233	200	200	399	387	388	375	300	400	400	400	300	300	300	300	300	300	300	300
	Winter	258	274	278	263	200	350	300	300	180	200	211	183	200	267	200	200	327	318	322	333	300	275	333	333	300	307	311	300	300	333	300	300
	Plaice	250	275	240	267	200	300	300	300	167	188	180	200	250	200	200	200	329	333	340	314	267	333	333	333	300	300	300	300	300	300	300	300
	Witch	238	257	233	267	200	300	300	300	171	191	200	200	200	200	200	200	338	343	340	329	300	333	333	333	300	300	300	300	300	300	300	300
	Yellowtail	250	275	200	300	300	300	300	300	200	225	167	200	300				340	338	325	333	300	300	300	300	300	300	300	300	300	300	300	300
	Monkfish	313	312	300	325	300	300	300	300	275	289	280	280	267	300	300	300	350	350	329	343	350	367	367	367	300	300	300	300	300	300	300	300
	Wolfish	233	260	200	300	200	300	300	300	175	214	200	200	200				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	Dogfish	333	333	325	300	300	350	300	300	200	250	233	233	250				300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300

2002		11										12										13													
Question #	species directed for	11										12										13													
n=		cod	had	pol	red	silv	win	pla	wit	cod	had	pol	red	silv	win	pla	wit	cod	had	pol	red	silv	win	pla	wit	cod	had	pol	red	silv	win	pla	wit		
		1	6	3	6	2	3	2	3	1	6	3	6	2	3	2	3	1	6	3	6	2	3	2	3	1	6	3	6	2	3	2	3		
	Cod	300	300	300	340					300	300	300	300	300	240			300	300	300	300	300	300	300	300	300	333	333	320			333	350	333	
	Haddock	300	300	267	300					300	250	333	300	250	267			250	300	250	200	300	300	300	350	400	333	333	300			333	350	333	
	Pollock	500	417	433	220					400	400	300	350	350	125			350	300	350	400	467	440		400	400	300	320	333	300			300	300	300
	Redfish	100	225	200	200					200	300	250	300	100				200	200	300	300	300	300	400	400	300	300	300	300			300	300	300	
	Silver Hake					400	300							350	300											300	300	300	300			300	300	300	
	White Hake					250								300												300	300	300				300	300	300	
	Cusk					300								200												300	300	300				300	300	300	
	Halibut					350								233												300	300	300				300	300	300	
	Winter	400	320	267	220					300	275	250	150					300	300	300	400	350	367	350		350	350	300	300			300	300	300	
	Plaice	300	200	225						300	200							300	300	300	350	400	350			350	300	300	300			300	300	300	
	Witch	300	200	200						333	300	333						300	325	333	325					350	350	300	300			300	300	300	
	Yellowtail					200								100												300	300	300	300			300	300	300	
	Monkfish					350	350	275		300	200	300						500	425	433	425				400	400	400	300	325	333	300		300	300	300
	Wolfish					200	200	200		200	200	200						200	200	200	200					300	300	300				300	300	300	
	Dogfish					300		300										300	300	300	300					300	300	300				300	300	300	

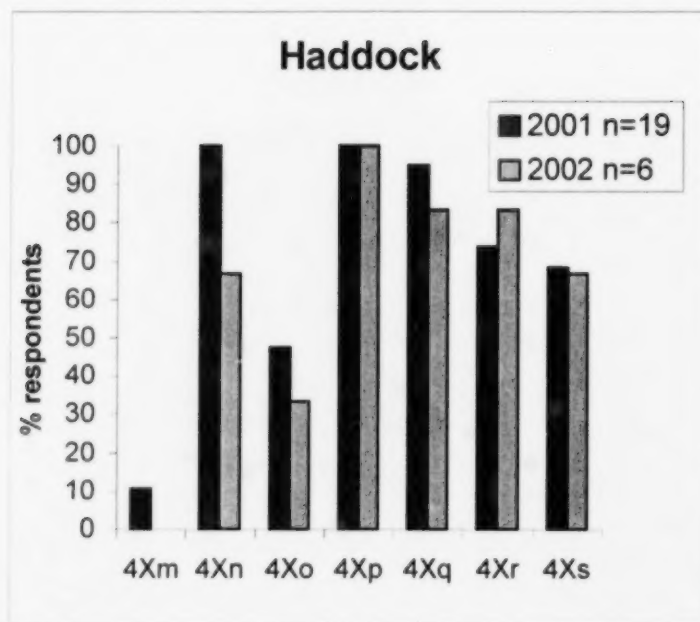


Fig. 1. Statistical Unit Areas fished in 2001 and 2002 by respondents who declared haddock as their primary directed species.

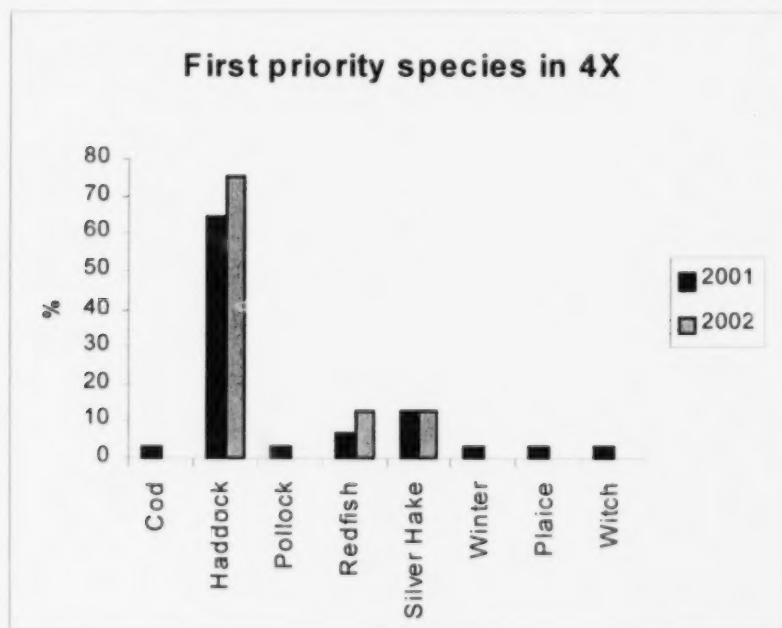


Fig. 2. Distribution of responses regarding the primary species directed for by mobile gear fishermen in 2001 and 2002.

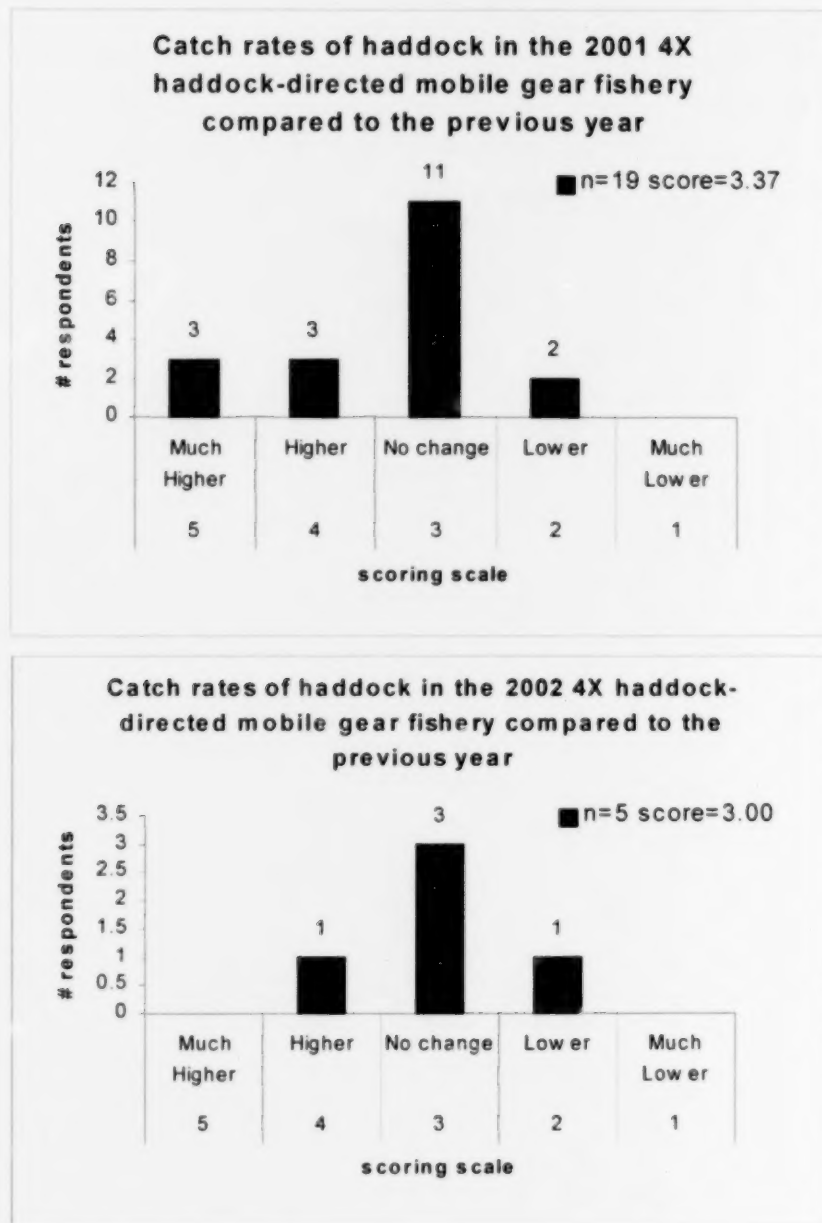


Fig. 3. Responses to question 10 on catch rate of haddock in the haddock directed fishery in relation to the previous year in 2001 (top) and 2002 (bottom), respectively.

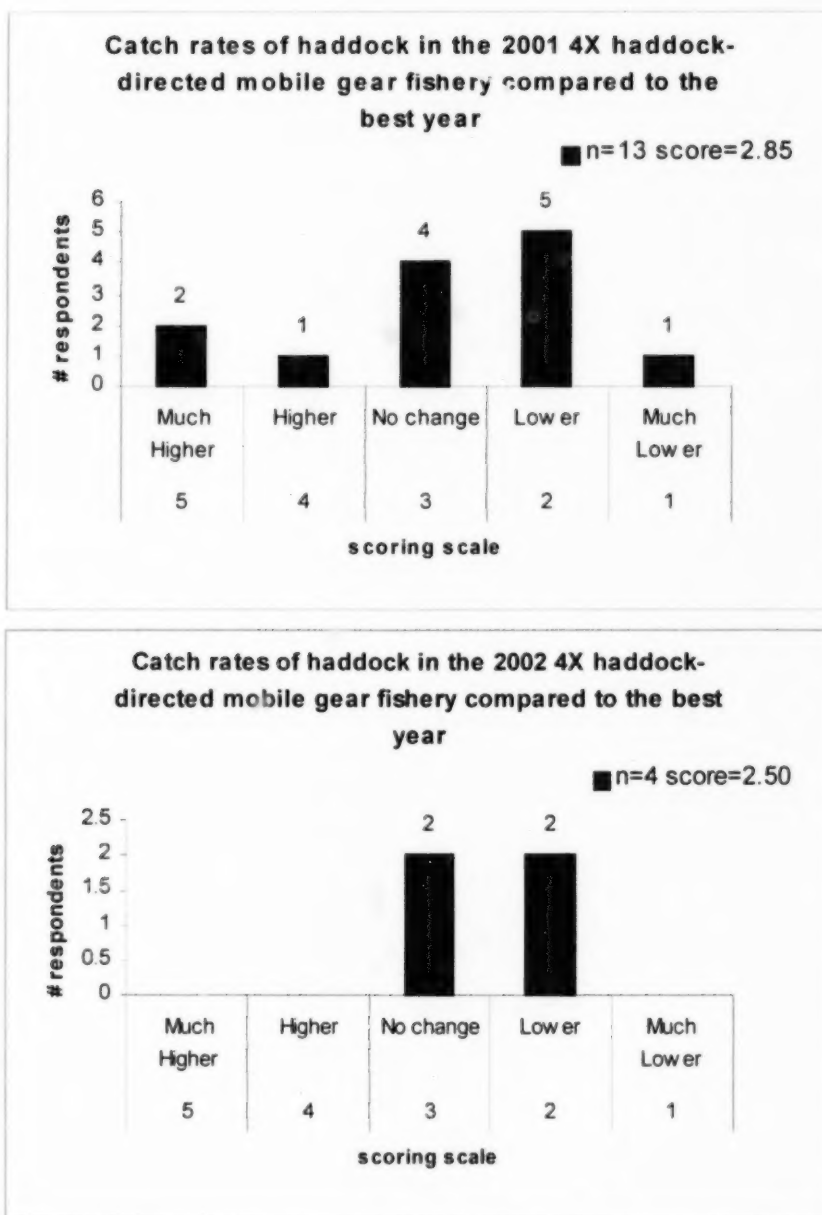


Fig. 4. Responses to question 11 on catch rate of haddock in the haddock directed fishery in relation to the best year ever in 2001 (top) and 2002 (bottom), respectively.

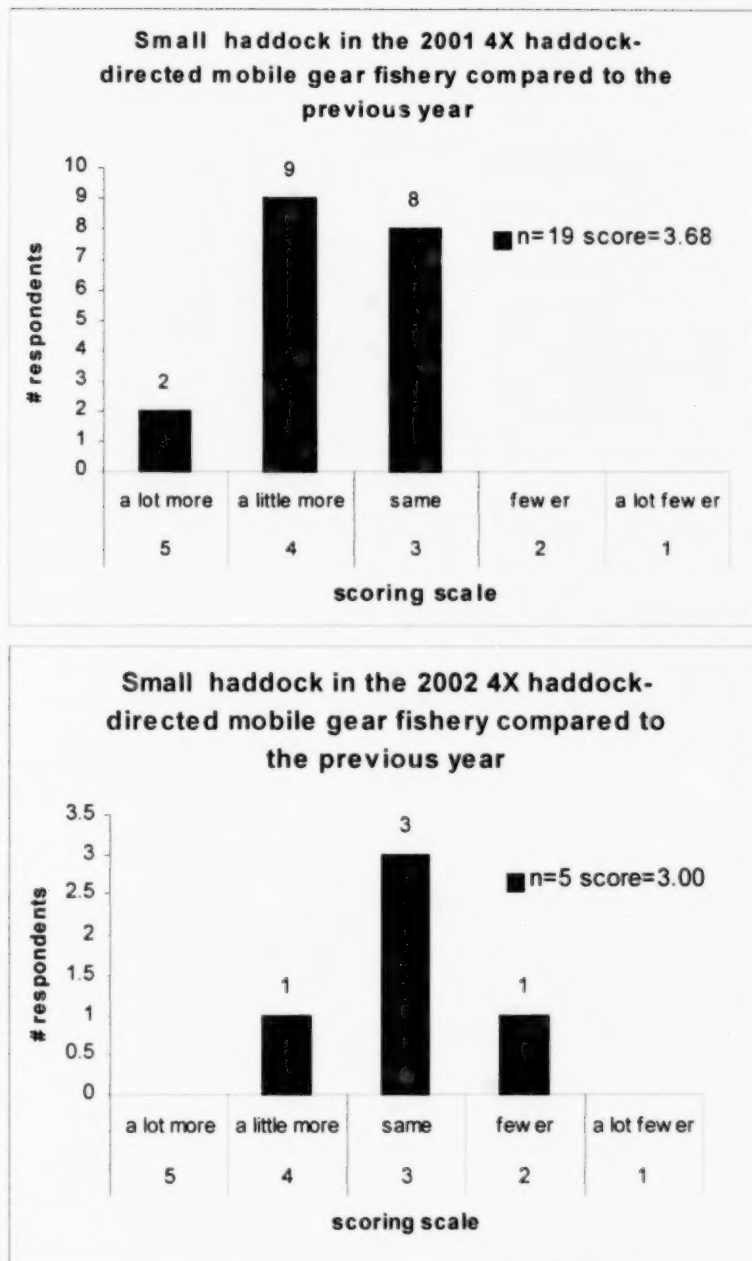


Fig. 5. Responses to question 12 on how much small haddock was seen in catches in 2001 (top) and 2002 (bottom), respectively.

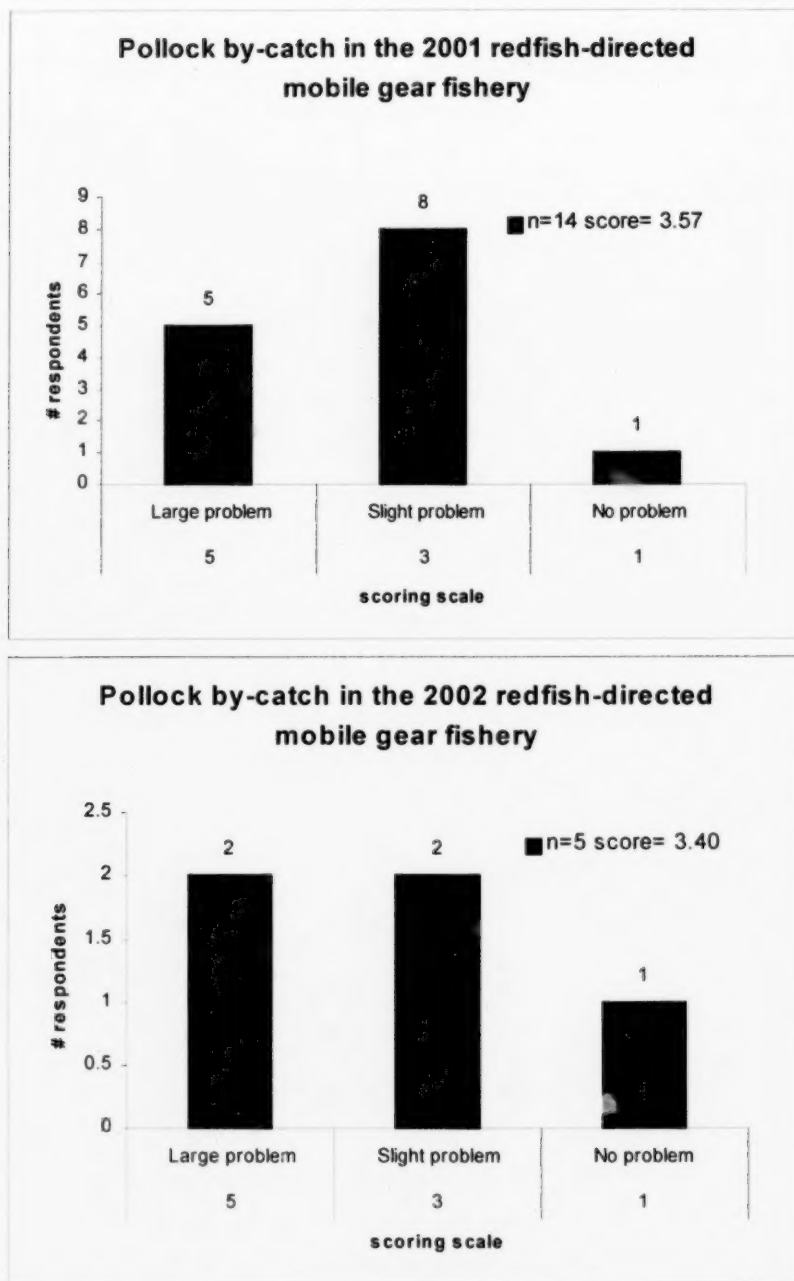


Fig. 6. Responses to question 15 on how much of a problem pollock bycatches were in the directed redfish fishery in 2001 (top) and 2002 (bottom), respectively.

Appendix 1: Questionnaire (reference numbers added to questions)

Marine Fish Division
Fisherman's Indicators – Draft Questionnaire
August 17, 2001

Interviewer: _____ Date: _____

1. What gear did you use to fish for groundfish this year?

Longline	Handline	Gillnet	Otter Trawl	Other (specify)

2. Describe changes in gear type or configuration that you used this year but not in the past.

3. What months of the year do you normally fish for groundfish?

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

4. What months of the year did you fish for groundfish this year?

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

5. What size vessel do you use?

< 45'	45-65'	>65'	

6. How long is an average fishing trip?

Daytrip	2-3 days	4-5 days	1 week	Other (specify)

7. How many years' experience do you have in the 4X groundfish fishery as captain and crew?

	<5	5-10	11-15	16-20	>20
Years Experience					

8. In order of importance, what species do you direct for?

	Rank
Cod	
Haddock	
Pollock	
Redfish	
Silver Hake	
White Hake	
Cusk	
Halibut	
Winter Flounder	
Plaice	
Witch	
Yellowtail	
Monkfish	
Wolffish	
Dogfish	

9. What areas have you fished for the following species in the current year?

	4Xm	4Xn	4Xo	4Xp	4Xq	4Xr	4Xs
Cod							
Haddock							
Pollock							
Redfish							
Silver Hake							
White Hake							
Cusk							
Halibut							
Winter Flounder							
Plaice							
Witch							
Yellowtail							
Monkfish							
Wolffish							
Dogfish							

10. How did your catch rates (e.g. lbs/day; lbs/1000 hooks) for the current year compare to last year?

	Much higher	Higher	No change	Lower	Much lower	No opinion
Cod						
Haddock						
Pollock						
Redfish						
Silver Hake						
White Hake						
Cusk						
Halibut						
Winter Flounder						
Plaice						
Witch						
Yellowtail						
Monkfish						
Wolffish						
Dogfish						

11. How do you relate the current year to the best year you have ever had?

	Much better	Better	No change	Worse	Much worse	No opinion
Cod						
Haddock						
Pollock						
Redfish						
Silver Hake						
White Hake						
Cusk						
Halibut						
Winter Flounder						
Plaice						
Witch						
Yellowtail						
Monkfish						
Wolffish						
Dogfish						

12. How much small fish did you see in your catches this year?

	A lot more small fish than last year	A little more small fish than last year	Same as last year	Fewer small fish from last year	A lot fewer small fish from last year	No opinion
Cod						
Haddock						
Pollock						
Redfish						
Silver Hake						
White Hake						
Cusk						
Halibut						
Winter Flounder						
Plaice						
Witch						
Yellowtail						
Monkfish						
Wolfish						
Dogfish						

13. How did the condition of the fish in the current year compare with the previous year?

	Much Thinner	Thinner	Unchanged	Fatter	Much Fatter	No opinion
Cod						
Haddock						
Pollock						
Redfish						
Silver Hake						
White Hake						
Cusk						
Halibut						
Winter Flounder						
Plaice						
Witch						
Yellowtail						
Monkfish						
Wolfish						
Dogfish						

Have you had by-catch problems in the following directed fisheries?

14. General Cod – Haddock – Pollock Fishery

Did you participate in this fishery? YES / NO

	Large Problem	Slight Problem	No Problem	No Opinion
Cod				
Haddock				
Pollock				
Redfish				
Silver Hake				
White Hake				
Cusk				
Halibut				
Winter Flounder				
Plaice				
Witch				
Yellowtail				
Monkfish				
Wolffish				
Dogfish				

15. Redfish Fishery

Did you participate in this fishery? YES / NO

	Large Problem	Slight Problem	No Problem	No Opinion
Cod				
Haddock				
Pollock				
Redfish				
Silver Hake				
White Hake				
Cusk				
Halibut				
Winter Flounder				
Plaice				
Witch				
Yellowtail				
Monkfish				
Wolffish				
Dogfish				

16. Silver Hake Fishery

Did you participate in this fishery?

YES / NO

	Large Problem	Slight Problem	No Problem	No Opinion
Cod				
Haddock				
Pollock				
Redfish				
Silver Hake				
White Hake				
Cusk				
Halibut				
Winter Flounder				
Plaice				
Witch				
Yellowtail				
Monkfish				
Wolffish				
Dogfish				

17. Halibut Fishery

Did you participate in this fishery?

YES / NO

	Large Problem	Slight Problem	No Problem	No Opinion
Cod				
Haddock				
Pollock				
Redfish				
Silver Hake				
White Hake				
Cusk				
Halibut				
Winter Flounder				
Plaice				
Witch				
Yellowtail				
Monkfish				
Wolffish				
Dogfish				

Comments on questionnaire:

18. Have we asked the right questions?

Yes	No

19. What should we have asked?

20. Comments:
